vol. VI no. 1
SEPTEMBER, 1946

Industrial Arts Is General Education
by Andrew T. Power

Are You in the Doghouse?
by Donald B. Greenwood

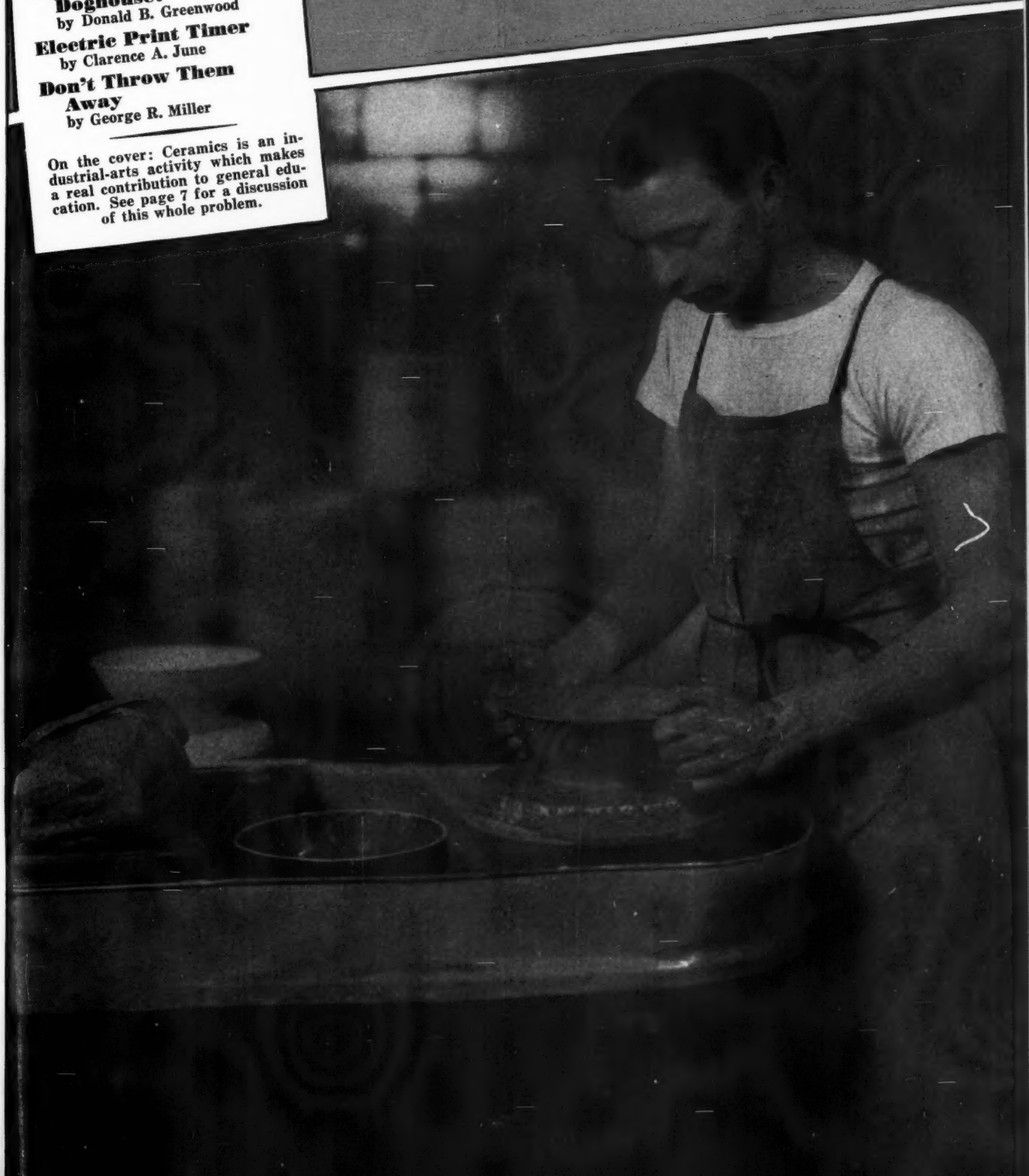
Electric Print Timer
by Clarence A. June

Don't Throw Them Away
by George R. Miller

On the cover: Ceramics is an industrial-arts activity which makes a real contribution to general education. See page 7 for a discussion of this whole problem.

School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS



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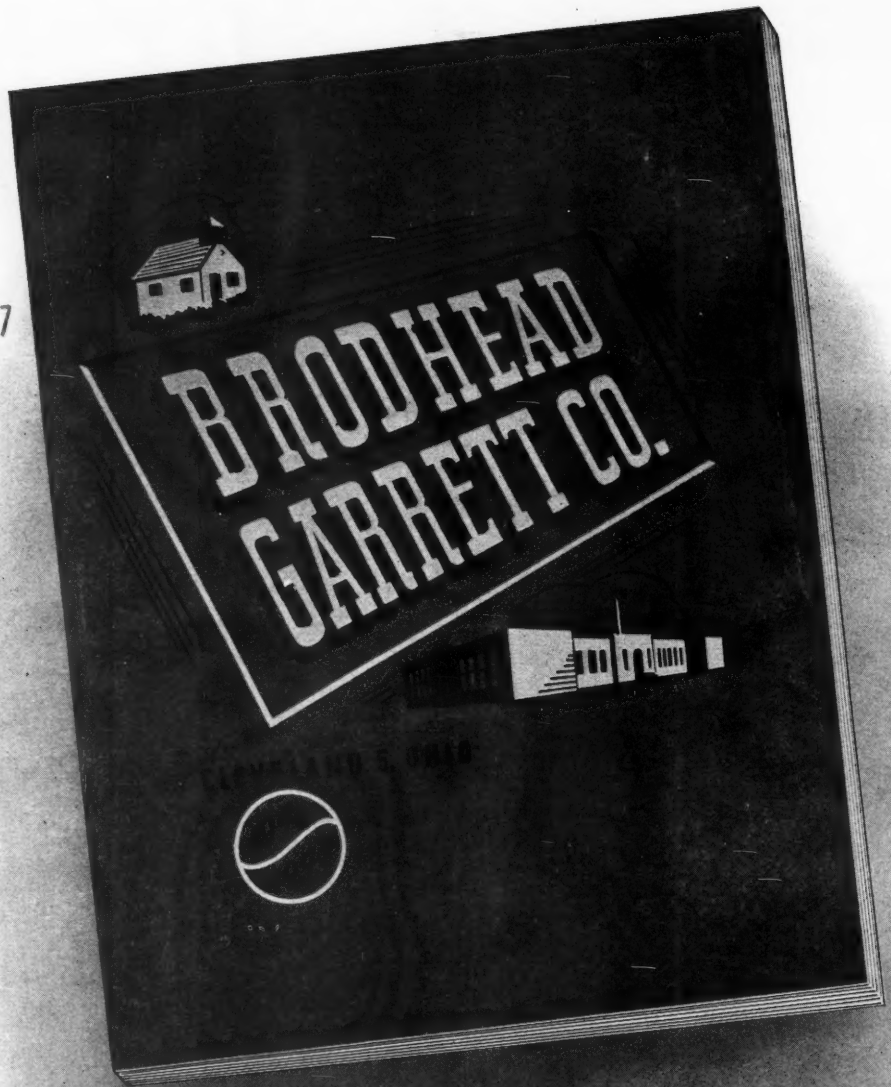

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School Shop

FOR INDUSTRIAL EDUCATION TEACHERS

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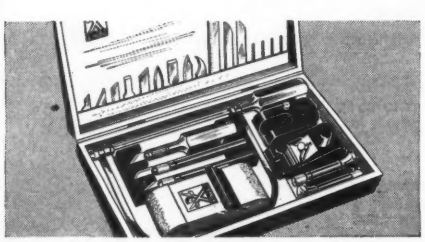

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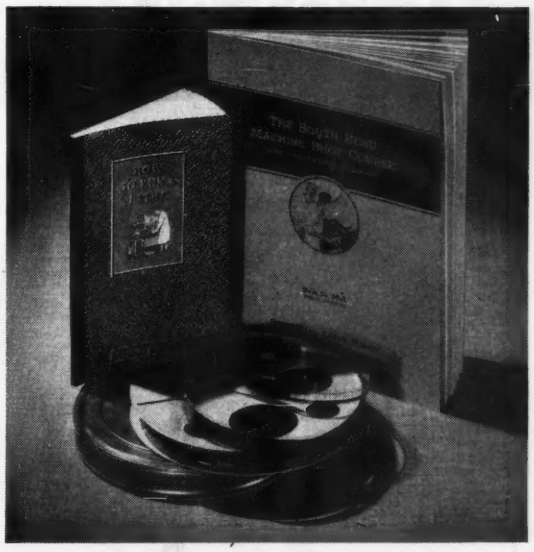

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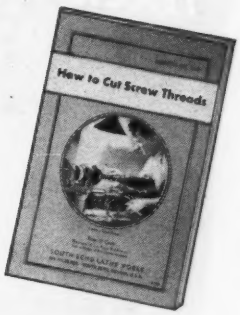

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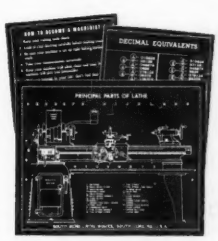

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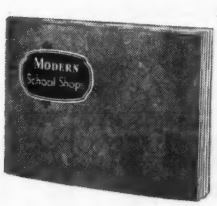

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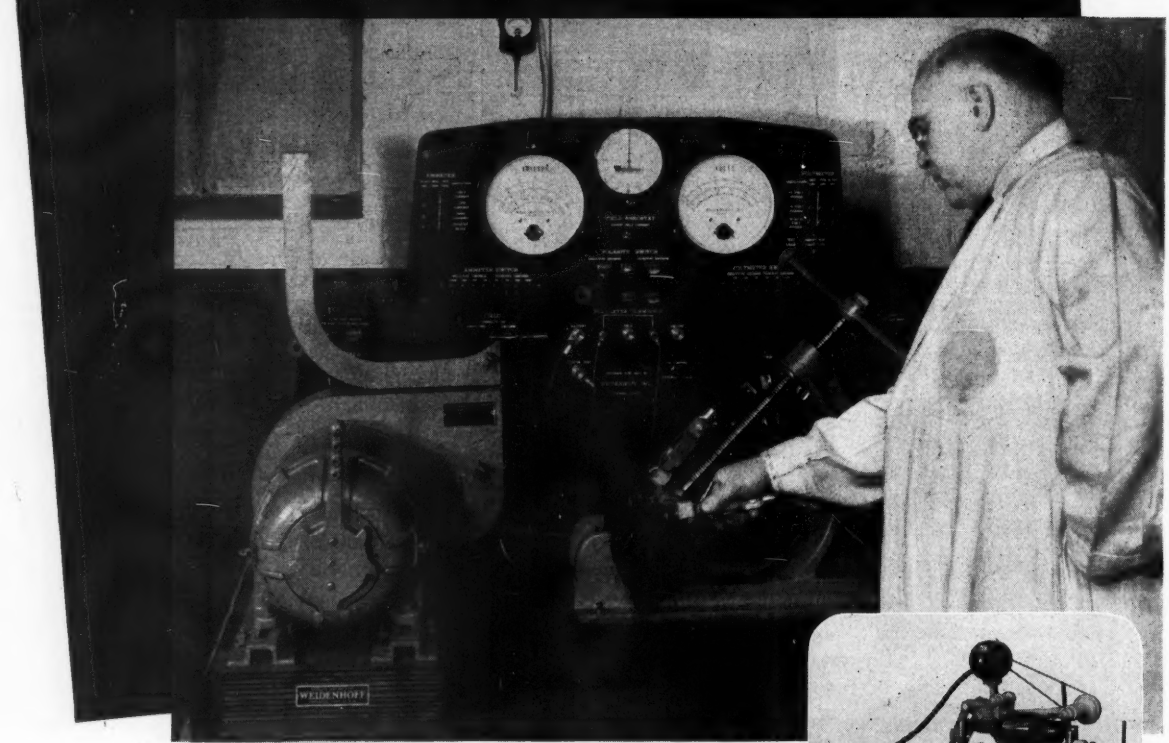

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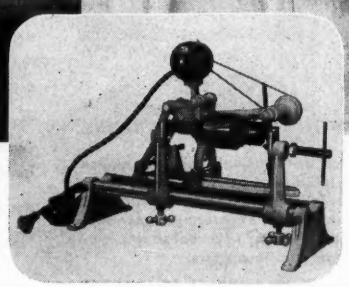

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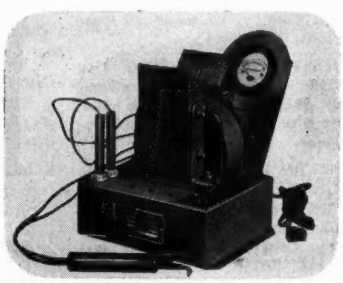

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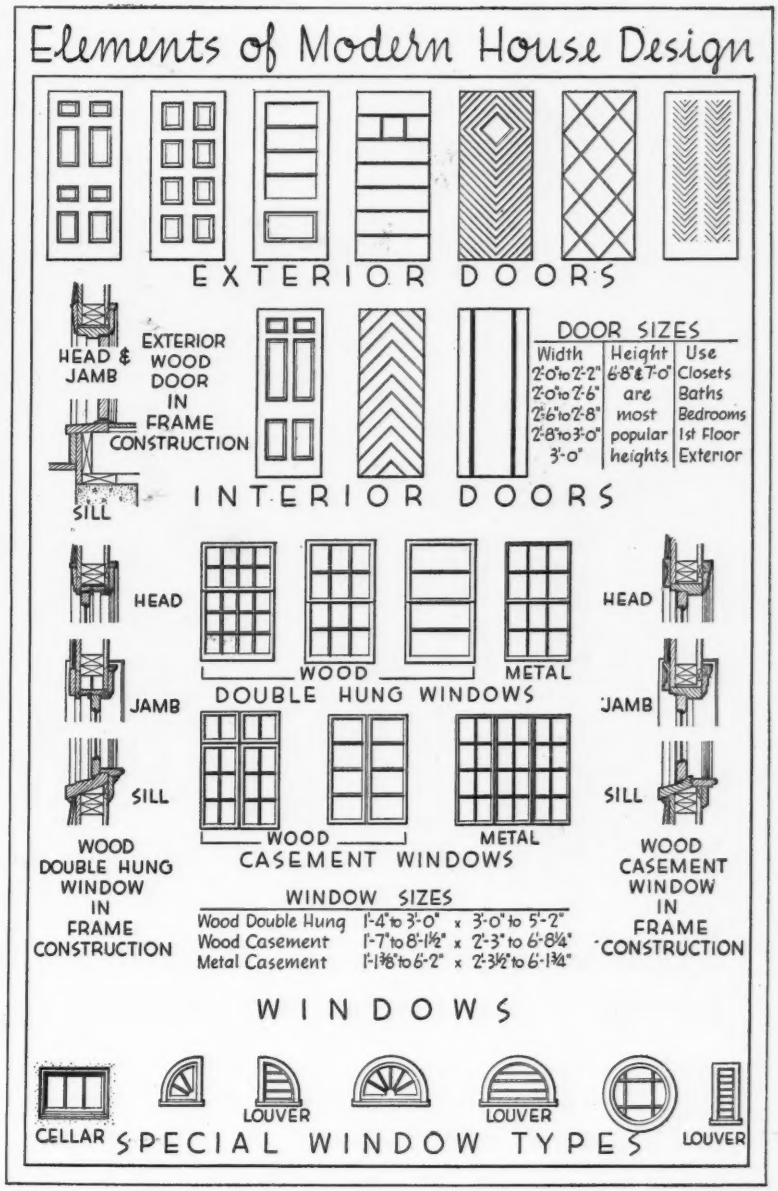

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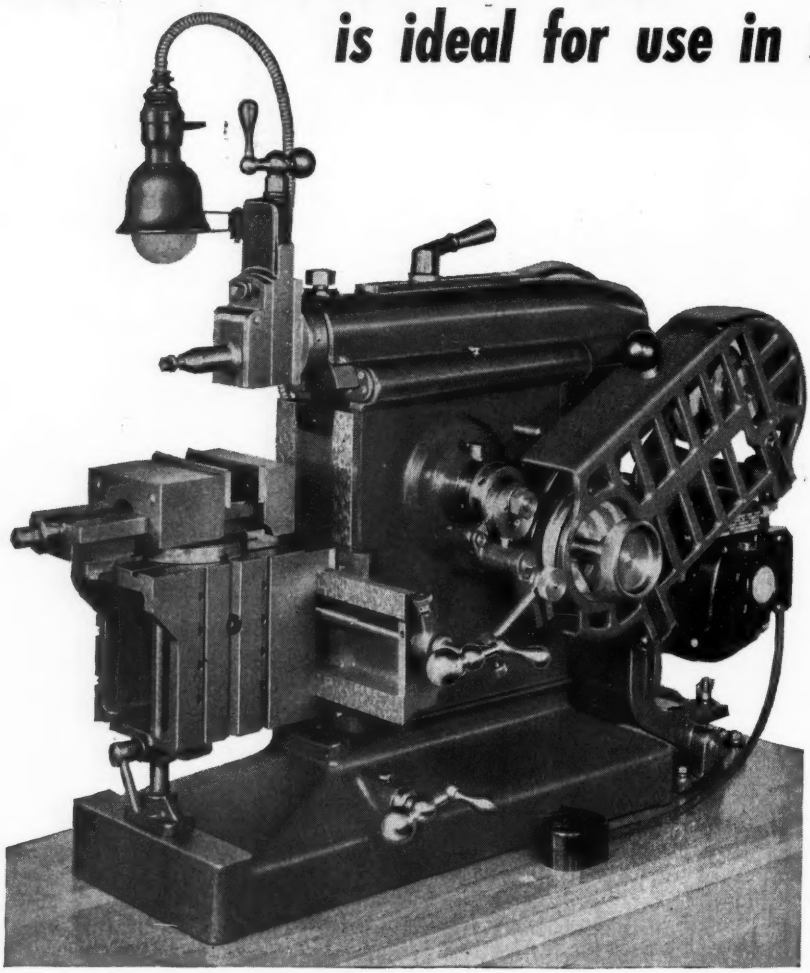

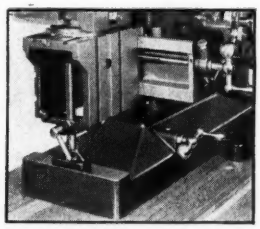

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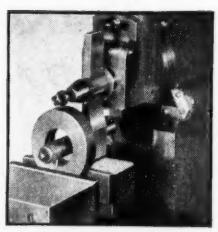

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Industrial Arts *Is* General Education

BY *Andrew T. Power*

The good teacher occasionally pauses to take stock of his activities to determine how they are contributing to the education of his students. This discussion will help in the process. Andrew T. Power teaches in the Bloomfield, N. J., High School.

ARE industrial-arts courses being fully utilized as a part of general education? To find the answer let us briefly review some of the important objectives of industrial arts and cite some contributions made to general education.

One basic aim is to assist in developing correlation between mental and physical achievement. Another aim is to have industrial-arts shops serve as laboratories in which students can use and correlate information learned in academic subjects. Development of leisure-time interests is another. Development of skills in fabricating materials of industry and the intelligent purchase, use, and maintenance of materials and finished products of industry are still other aims.

Unfortunately there are some school systems in which industrial-arts courses are still used as a means of teaching trade skills and as a repository for youngsters with limited mental capacities or for those with behavior problems. If this valuable phase of education is to make its maximum contribution to general education, some concepts of its measurement in those schools may need altering. It has often been customary to judge relative contributions of industrial-arts courses almost entirely by the number and quality of projects produced by the students. In vocational and prevocational courses, consideration of the production angle is essential. In judging the value of general education industrial-arts courses, production should be only one of many factors, and by no means the most predominant, to be considered.

By making industrial arts available to all pupils in all grades a most valuable contribution to child development is made. As pupils gradually mature and begin to formulate vocational and professional choices, it is desirable to place more emphasis on that phase of industrial-arts education most related to their individual choices. But specialization should not be indulged in at the expense of the general program. These courses should be designed to provide equally valuable general information and experience for one who may be a prospective minister, physician, or banker, as for prospective masons, carpenters, or laborers. It must be remembered that, regardless of professional choices, most humans eventually become maintainers of homes and users of industrial products.

The first aim, development of correlation between mental and physical achievement, is a natural and persistent one. Whenever a child of any age does handwork of any kind, he is accomplishing that aim to some degree. Those responsible for industrial arts develop that aim by presenting an extensive variety of activities. A beginning is made in the kindergarten by working with paper. Other materials are added as the children's growth warrants their use. Many persons overlook the important contributions made to general education by primary and intermediate teachers who do elementary industrial-arts work with paper, cork, textiles, clay, wood, and other easy-to-work materials. This early program is a definite contribution to child development through training in correlation of mental and physical effort. In junior high school, industrial-arts courses are usually on general-shop or general unit-shop bases. Ordinarily at this point, girls are denied the privilege of such courses because of programming difficulties or lack of teachers and facilities. It is sincerely hoped that industrial-arts courses for girls, at least on the basis of home mechanics, will become a required part of future programs, because statistics show that women, not men, use most mechanical appliances and gadgets common to homes. It seems reasonable to feel that future homemakers should know how to maintain their expensive mechanical equipment. Likewise, in junior high school all boys should have the privilege of some minimum training in the art of homemaking. In junior high school the variety of materials available for industrial arts is broadened to include various types of metals, electrical materials and equipment, plastics, printing materials and equipment, and other available materials, as well as broader use of materials with which the students are already familiar. The greater the variety of materials available with which to work, the greater is the breadth of experience and, therefore, the greater the contribution made toward correlation of physical and mental development.

Industrial-arts courses provide an important medium for application of information learned in academic subjects and for further development of that information. For example, in the field of English a student's vocabulary is constantly being enriched by semitechnical terms peculiar to equipment used and trades studied. Class discussions of personal requirements for various vocations place emphasis on practical English as it may affect a pupil's future livelihood. The subject of printing affords another superb opportunity to stress importance of functional English and its ramifications. When a student views his first proof copy in the school print shop, he has concrete evidence of his composition, grammar, and spelling and, furthermore, he has constructive impetus to correct shortcomings in those skills.

Practically the only limit in industrial-arts courses to application of mathematical information, acquired on the academic level, is the limit of the shop course itself. The greater the variety of subjects introduced and projects attempted, the more extensive are the opportunities to apply practical mathematics. Opportunities abound for applying mathematics in figuring materials needed for projects, in developing construction and assembly layouts, in planning machine operations, and in computing costs of finished projects. Such practical applications of mathematics do much to vitalize that knowledge for students.

One of the main objectives of social studies, that of training for life in a democracy, receives immeasurable support through practices followed in industrial-arts courses. Picture for a moment 20 to 30 inexperienced boys, with varying abilities and many immediate objectives, grouped in limited space with common materials, tools, and mechanical equipment and limited time for them to accomplish the many things they want to do. That situation prevails in school shops each period of every day and desirable results are achieved only through democratic organization and practice. Democratic operation of many industrial-arts shops is strengthened by assignment of students to some of the physical responsibilities connected with operation of the shop. In addition, desirable and also objectionable social aspects of various vocations are discussed in close relation to actual processes in-

(Continued on page 16)

A practical safety program for your school shop — —

ARE You IN THE Doghouse?

BY

Donald B. Greenwood

Nothing serves to destroy public confidence in an industrial-education program faster than a serious shop accident. Here is a list of safety activities which will enable you to check over your own safety program. Donald B. Greenwood is State Supervisor of Industrial Arts, Utah State Department of Public Instruction.

ACCIDENTS have claimed as many lives and caused as many injuries in the United States during the last few years as has the war in which we have been so actively engaged, according to the National Safety Council. We, as industrial-arts teachers, have a grave responsibility for the safety education of American youth. Our efforts could contribute mightily to a reduction in accident toll, particularly among young Americans.

One of the main objectives of industrial-arts education is "To develop correct habits, attitudes, and ideals of health and safety in the student."* Training in the school shop can be very important in shaping the safety habits and conduct of boys who will eventually take their place in the industries or professions as mature workers. Their ability to work safely on the job or in the home may be largely a result of their shop training experience which may be either good or bad. The type of safety training your students receive depends on you, Mr. Teacher—it's your responsibility. What are you doing about it?

For many years our industries, both large and small, have been doing something about safety, and they haven't been making a mountain out of the proverbial molehill either. Millions of dollars have been spent on safety training and accident prevention. Yet this total expenditure will not bring back one of the men "accidentally" killed, or will it replace the missing finger, hand, or foot of the man who takes a chance. The expenditure of this money has saved many lives, as is proved by safety records of many of our industrial firms. For example, the Atlanta shop of the Pullman Company worked 1,842,544 man hours from November 1941, to March 1944, without a single lost-time accident. Such a record proves that good safety training plus careful supervision and conscientious effort on the part of employees and employers results in fewer people being injured or killed.

"A stitch in time saves nine" our grandmothers used to tell us. It still holds true. Is it worthwhile to take a minute, or less, to wipe the spilled oil or grease from the floor? Will it save a boy's eye if five minutes are taken to readjust the guard on your grinder? Will your time be well spent if you take an hour tonight after school to make a safety check-up on your shop and its equipment, in order to insure the safety of the dozens—perhaps hundreds—of students who will enter its doors tomorrow? Of course it's worth the time —ten minutes repairing the cord on that soldering iron may save Johnny's life tomorrow, for people have been known to be electrocuted while using such tools when a perfect "ground contact" is accidentally made.

Perhaps your shop is 100 percent safe; probably it is not. A quick visit into many school shops reveals some striking examples of unsafe conditions; and occasionally unsafe practices in the use of tools and power machines are observed. Are the guards in proper position on your jointer, saw, and other machines—and are they being used? Are the tool rests on your grinders close enough to the wheels to prevent a boy's finger from slipping through? Are belts guarded, are supplies such as lumber and metal properly stacked, are your electrical controls and extension cords in good shape? These are important questions, for this afternoon or tomorrow you may be "in the doghouse." An irate or even distracted parent may hold you responsible and may have just grounds for such placement of responsibility.

Did you say your shop would be safe if your superiors would furnish the guards and new cord and switches and safety supplies you need? If that's the case, put it up to your superiors as this article puts it up to you—probably they will insist on your shop being safe. Often they haven't the time or the "eye" to spot unsafe shop conditions—*you* are the man for that.

What can you do? Here's a suggestion: Start a safety campaign in your shop. Do it now—today. Adopt a safety program that will prove effective in reducing, if not entirely eliminating, your shop accidents. In planning such a program, read some of the valuable information to be found in recently published handbooks and textbooks on industrial safety—you'll find some sug-

Industrial Arts in Utah, Handbook, Part 1.

gestions there that may help you. You may want to think over the following Five Star Safety Plan adopted by one fellow. He decided that in order to improve his accident record he would do five specific things—and do them well. Here's what he did:

★ 1. Studied each operation that was likely to be performed by students in his shop in order to discover any hazards.

★ 2. When an unsafe condition was found, he eliminated it immediately so as to make the operation as safe as possible.

★ 3. He gave each student personal safety instruction from time to time, concerning the work he was doing at the time. This instruction should be supplementary to group safety instruction.

★ 4. He watched each student at work and observed his safety habits and performance. He followed up on previous instruction by checking him occasionally on his work. He was friendly and logical in criticizing—making him understand why he must work safely.

★ 5. He, as an instructor, was never guilty of violating safety rules himself.

Set a near-perfect safety example by conducting yourself properly, by using guards, by observing safety zones, and by taking precautions yourself.

As you well know, there isn't much purpose in locking the barn door after the horse has gone. Likewise there isn't a great deal of pleasure in installing a guard after Johnny has been sent to the hospital. In order to prevent an accident you've got to get to the bottom of the trouble — to the source — and get there before the accident happens. You will be on the safe side if you have a prevention program and if you make it work.

Some activities you may want to include in your safety program are:

1. Provide a well-equipped first-aid cabinet for use when accidents do occur.—The industrial-arts teacher should have more than a beginner's ability in administering first aid. He should recognize the fact that serious injuries may occur in his shop, and that prompt and correct first aid may forestall very dire consequences. He must be "safety conscious" and must be prepared for any emergency. The organized study of such first-aid manuals as those published by the Red Cross and some of the insurance companies will contribute to the teacher's knowledge, and any questions which may arise in his mind during such study will gladly be answered by his local or school physician. The first-aid kit for use in the shop should be located in a convenient spot in the shop and, if kept locked, the key should be readily accessible to the teacher and to the members of the school safety organization. To be of value, a first-aid kit must be kept well stocked—regular inspection should be made and needed items should be requisitioned without delay. The shop safety engineer should be acquainted with the first-aid procedures of the shop. To be on the safe side, it should be understood definitely by the students that all injuries, no matter how slight, are to be reported to the instructor. Any extended treatment or treatment of serious injury must be done by a physician or the school nurse. It is a wise policy, becoming more prevalent, to prepare an accident report as a safeguard for the teacher.

2. Check guards on all machines.—This part of the safety program should include a survey of both belt-driven and direct-drive machines.

Proper guards should be used on all the "cutting machines," and exposed belts should be covered in such a way as to eliminate any chance of injury. Students should be taught the value of the guards installed, and should not be permitted to operate machines with guards removed or out of adjustment.

3. Check all electrical connections, switches, and cords.—Make certain that there are no exposed "hot" wires in the shop. Frayed and worn cords should be replaced. Loose cord ends, broken sockets and switches should be repaired or replaced. An independent switch should be provided at each machine, and it should be located in a position convenient to the operator. Main line and master switch boxes should be locked, and any tampering with electrical lines or controls should be strictly prohibited—this includes the much too common practice of "fixing" fuse plugs with pennies. Remember that electricity is an invaluable servant of man when properly handled, but it can, when its laws are violated, be a very dangerous element.

4. Be certain that all materials and supplies are safely stacked.—Carefully stacked material, such as lumber or bar iron, is not only much more readily accessible but is much less likely to cause injury or damage through falling than is such material placed on racks in a helter-skelter fashion. Sturdily constructed racks and shelves should be provided for all materials, and they should be so constructed and installed that they will not fail structurally or permit material to fall from its resting place. Students should be instructed in the proper methods of stacking and removing material so as to reduce the possibility of accidents in this area of the shop.

5. Check lighting facilities.—Be certain that proper illumination is provided at all machines, keeping in mind the fact that natural north light is the best for precision work. Artificial light should be provided as necessary, and data is available from the major electrical firms as to the recommended minimum standards for proper illumination on various types of work. Special care should be taken to provide sufficient light in drafting rooms, where eyestrain may easily develop, and on stairways, halls, and aisles where there is danger of falling. Industry generally is recognizing the fact that poor illumination is conducive to accidents, and, as shop teachers, we may well follow their example by providing plenty of light, properly located, for the safety and well-being of our students.

6. Provide open aisle space in the shop.—In those areas of the shop where most student traffic occurs, make certain that adequate unobstructed aisle space is available. A study of the layout of your shop may reveal to you more convenient arrangements of machines and benches which will reduce traffic congestion and tend to isolate the machines from the major traffic areas.

7. Establish safety zones around the "dangerous" machines.—In order to protect the operator of the machine, and to reduce the temptation on the part of students to indulge in "horse-play," a system of zoning can be set up for the shop which involves the designation of a safety zone around each machine where accidents are likely to occur. Zone markings may be painted on the floor, using a bright colored paint, thereby setting up boundaries within which no one but the operator of the machine may trespass while the machine is in operation. Such a zoning system helps to eliminate the "stacking up" of students while they wait their turn at a machine, a practice which creates an accident hazard.

8. Check over the hand tools.—At the junior-high-school level it is of utmost importance that students be given every opportunity to perform at their best. This can only be done if good quality tools are provided, and if these tools are maintained in good physical condition. Naturally this is true in all levels of shop work, but its importance cannot be underestimated where beginning students are involved. Planes and hammers with loose or broken handles; chisels with "mushroom" heads, or poorly sharpened; files without handles—all these are likely to cause injury and are not conducive to good habits of workmanship. Therefore, a planned safety program should include a thorough inspection of all of the tools used in the shop, keeping in mind the objective of repairing, adjusting, and replacing defective tools as is necessary.

9. Check guards, tool rests, and stones on all grinders.—Perhaps no other power-driven machine is as common in all shops as is the power grinder. Because of its almost universal presence in the shops it is sometimes unnoticed and little attention is given to its proper maintenance. In too many cases, grinders may be observed with guards and tool rests out of place, or missing entirely, and with stones worn, chipped, or cracked. The importance of having sound stones in use cannot be overemphasized, for the disintegration of a stone revolving at high speed can result in very serious consequences. In connection with grinder operation, students should be required to wear good quality safety goggles when using any type of grinder. Serious eye injury can

(Continued on page 14)

Electric Print Timer

BY *Clarence A. June*

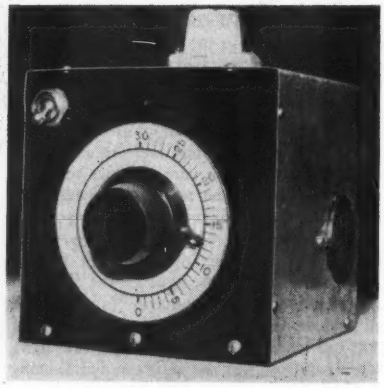


Figure 4

This project will invoke considerable student interest, particularly from those having photography as a hobby. It offers the opportunity of teaching the fundamentals of electricity, with the mercury switch adding an element of interest not usually found in this type of project. Clarence A. June teaches in the J. M. Wright Technical School, Stamford, Connecticut.

TESTED PROJECT

THE various electrical photographic print timers now on the market are looked at enviously by many amateur photographers. These timers are connected in the power line with the printer or enlarger, the dial is set for the desired number of seconds of exposure, a switch is thrown, and the lamp of the printer or enlarger goes on for that number of seconds only.

The timer illustrated can be made easily in the school shop and will captivate the interest of students. The machining involved is not difficult and offers an opportunity for correlation with the work of the electricity department. Members of school photography classes and clubs will be especially interested in the project.

An electric clock motor of the self-starting type is the core around which the timer is built. In addition, a few odd radio parts and some aluminum or light metal is required. It will work up to 30 seconds only, but practically all contact prints and a large number of enlargements come within this range.

The timer is simply an electric clock mechanism with a simple clutch attachment and a mercury switch. The point of engagement of the clutch is shown in seconds and the mercury switch breaks the circuit when the clock mechanism carries it to a near horizontal position. Construction details follow.

The clock is first stripped of all unessential parts, leaving only the shaft of the sweep second hand exposed. On this shaft is mounted one end of the clutch mechanism (part 5, Figure 1). The hole for the shaft in part 5 is made either for a press fit or a small set screw can be used in the hub and the hole made a slip fit. Care must be taken in the machining of parts 5 and 2 so that the 5° tapers match well.

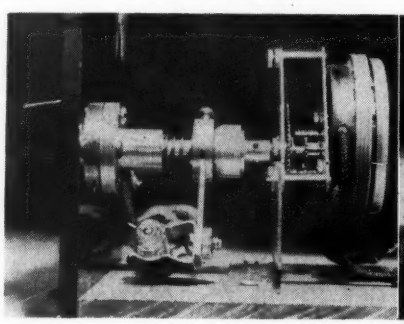


Figure 2

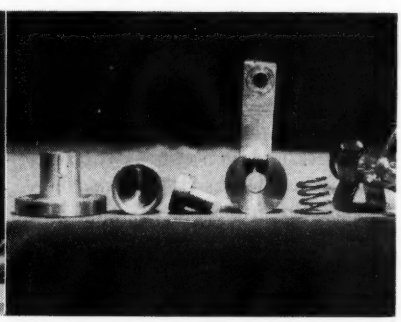


Figure 3

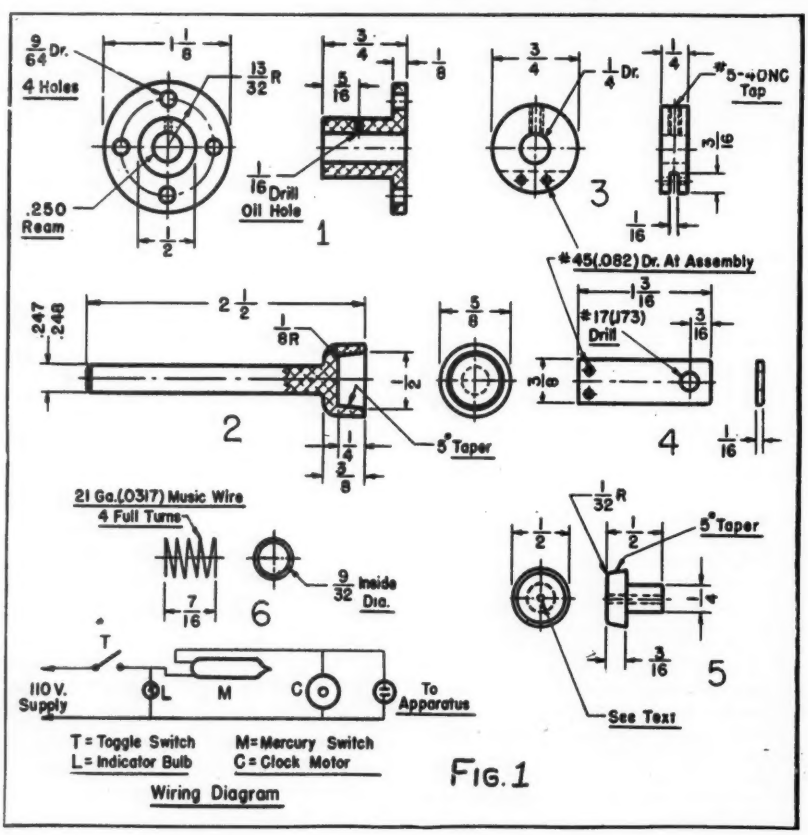


FIG. 1

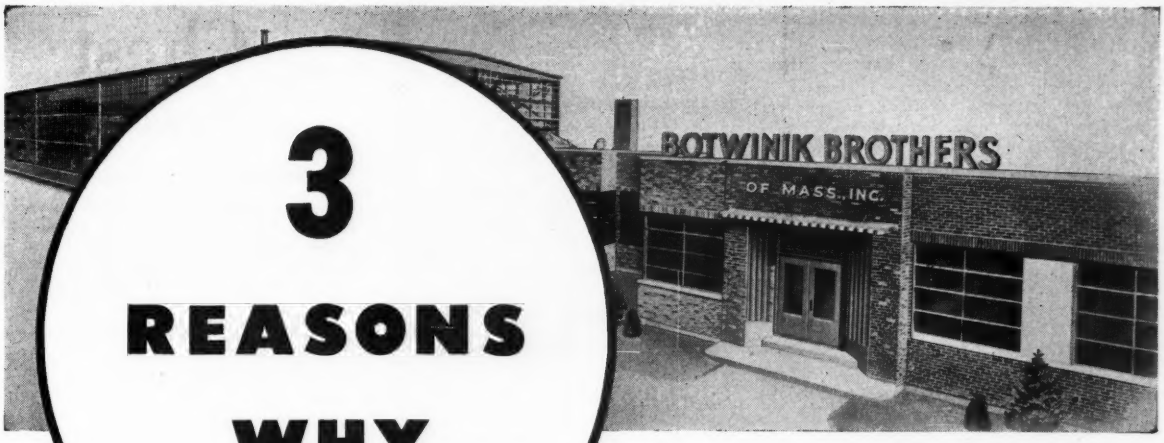
The bracket which supports the clock motor is not detailed in the drawings because there is much variation in the types of clock motors used. A general idea of the bracket can be had from the picture (Figure 2).

Parts 3 and 4, which make up the bracket for holding the mercury switch, are drilled together at assembly and fastened with two No. 3 R.H. screws. The clip which holds the mercury switch is bolted to part 4. This clip and mercury switch can be obtained from various old thermostatic controls or purchased new at electrical supply houses.

The assembly of the parts is shown in the picture (Figure 2). Be sure that part 1, which is mounted on the bakelite panel, lines up well with part 5 so that there will be no binding of part 2.

The size of the dial will depend on the size of the indicator knob used. The dial can be made out of illustration board with graduations similar to those shown in the picture of the completed timer (Figure 4), and mounted on the

(Continued on page 30)



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Cedar-Lined Chest

BY *Ward Sager*

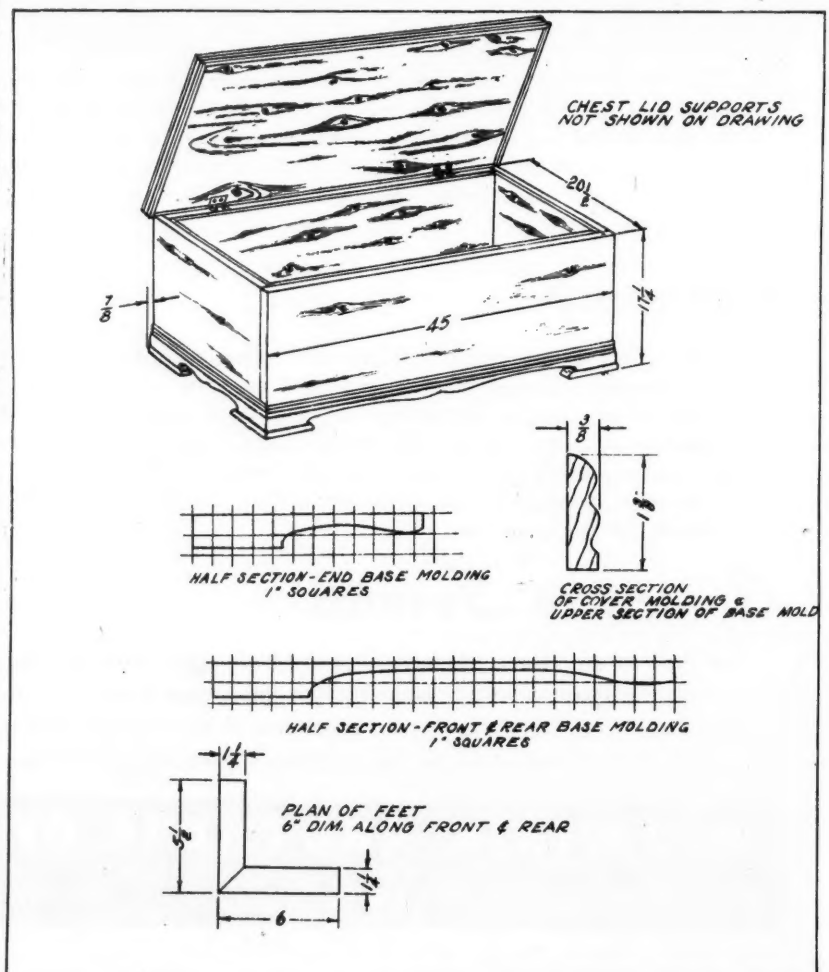
This is an advanced woodworking project that can be made in the average woodshop and features simplicity in construction detail. Ward Sager is Associate Professor of Industrial Arts, Central Michigan College of Education, Mount Pleasant.

TESTED PROJECT

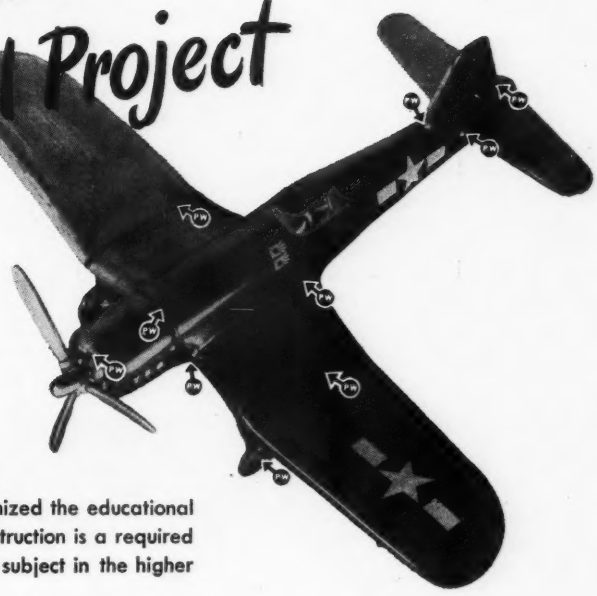
THE present scarcity and high cost of cabinet woods has posed something of a problem for teachers of advanced woodworking courses. Traditional woodworking projects such as end tables, coffee tables, desks, magazine stands, etc., are usually constructed of hardwoods because of their superior wearing and finishing qualities; however, more easily obtained and cheaper softwoods are entirely satisfactory for some types of projects. The chest shown in the photograph was constructed of native Michigan pine lined with aromatic red cedar and the total cost of the project, including hardware not shown in the photograph or drawing, was less than $12.00. The cedar lining is 3/8" x 2 1/4" tongue and grooved S2S which is sold in cartons containing 48 square feet for $4.80. The box can be built from seven pieces of 1" x 8" x 8' pine which will cost approximately $4.00 if selected kiln dried lumber is used. Hardware, including nails, screws, hinges, chest lid supports, and lock, together with abrasive paper, glue, and finishing materials, will bring the cost to approximately the figure mentioned above.

In constructing the box, 8" stock was edge jointed and glued up with dowels to provide boards of the required width for front, back, bottom, cover, and ends. Standard box construction was not followed. Instead, as reference to the drawing indicates, the back of the box is set in between the end boards so that end grain shows only on the front. The top is cut 1/4" longer and 3/8" wider than the box in order to provide clearance for the hinges on the back and to allow for shrinkage or expansion that may result from changes in moisture content of the softwood lumber.

The tongue-and-grooved cedar lining is fastened in the same manner as flooring, by nailing through the tongue. Each piece should be coated with glue on one side before nailing with 7/8" No. 20 brads. The bottom is covered first, then the ends, and last, the front and back and one face of the cover. Approximately 24' of cover moulding 3/8" x 1 3/8"


CHEST LID SUPPORTS NOT SHOWN ON DRAWING
20 1/2
7/8
45
11 1/4
3/8
1 3/8
HALF SECTION-END BASE MOLDING 1" SQUARES
CROSS SECTION OF COVER MOLDING & UPPER SECTION OF BASE MOLD
HALF SECTION-FRONT & REAR BASE MOLDING 1" SQUARES
1 1/4
PLAN OF FEET 6" DIM. ALONG FRONT & REAR
6

Now is the time to start a Model Project in your CLASSROOM



MANUAL TRAINING INSTRUCTORS have long recognized the educational value of model building. In many schools Model Construction is a required subject for junior high school students and an elective subject in the higher grades.

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Instructors are increasingly using model building to teach aeronautics, a field in which young people see careers as well as hobbies. For this field model building provides a variety of valuable training—in drafting, in aeronautical engineering, in aerodynamics. *Above all, model building teaches good craftsmanship.* To help prepare your course in model building, a FREE booklet is now available, showing "slick new tricks" for model builders. Included are ways in which Plastic Wood makes model construction easier and neater.

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similar to that shown in cross-section on the drawing is required to trim around the cover and bottom of the box. This moulding can be made quite easily by cutting saw kerfs in the stock on the circular saw and working to shape with coarse sandpaper. Half patterns for the base moulding may be drawn by the method of squares as indicated and the moulding sawed on the bandsaw. All mouldings should be mitered at the corners and fastened with glue and brads. The feet are simply nailed through the base moulding and four corner blocks that were fastened to each corner of the bottom of the box. These corner blocks do not show on the drawing. Metal gliders of suitable size are fastened to the bottom of each foot at the corner.

All moulding and the feet should be nicely rounded with sandpaper. Heads of finishing nails and brads should be set below the surface and the holes filled with stick shellac or sanding dust and glue. The entire project should be thoroughly sanded with No. 2-0 sandpaper before staining or filling.

Doghouse . . . from page 9

result from failure to do so. Wheels should be trued up periodically, and any wheel, the quality of which is in any way questionable, should be discarded.

10. Provide for proper ventilation and exhaust of fumes.—In shops where spray painting, welding, and similar fume-generating work is done, provision should be made for forced-draft ventilation and exhaust of harmful fumes. Where such is not possible, suitable mask filters should be provided for students exposed to fumes. Wherever possible, steps should be taken to keep dust, smoke, or fumes to a minimum, thereby improving the working conditions within the shop.

11. Check on waste disposal.—The ordinary industrial-arts shop produces a variety and, in some cases, a rather large volume of waste material, including dirty, oily, or greasy rags, wood scrap, metal scrap, sawdust and shavings, etc. Accumulations of such materials not only detract from the appearance of the shop, but also result in wasted space, confusion, loss of tools and supplies, contamination of usable supplies, and hazards to safety both from the standpoint of injury by falling, and from the possibility of fire through spontaneous combustion. Therefore a safety program in the school shop should include a thorough clean-up of the shop proper and any auxiliary rooms such as the paintroom, toolroom, and stockroom. All material which rightfully can be classified as waste should be thrown out and, more important, proper procedures should be set up to avoid any further accumulation of such material. Inflammable liquids should be kept, if possible, in fire-proof cabinets; oily or paint-filled rags should be kept in air-tight metal containers, and proper provision should be made for handling such materials as oxygen, acetylene, or other gasses, if such are used in the shop.

12. Provide adequate fire extinguishers.—Various types of fire-fighting equipment should be located conveniently throughout the shop as is necessary. Expert advice on the placement of extinguishers will be given gladly by the local fire department. If the school administration does not require or provide regular inspection of this protective equipment, such inspection should be made a part of the shop teacher's safety plan.

13. Develop a safety organization among the students in the shop.—Through the utilization of student personnel the instructor's safety training responsibilities can be materially lightened. A "safety engineer" can be appointed or elected in each shop class and this representative can act as a member of the school shop safety committee which includes safety engineers from all classes. The safety engineer, under the guidance of the shop teacher, may give safety tests to other students, he may make safety inspections of the shop and its facilities, he may maintain a constant check on machine guards and other safety devices, and he may be delegated to report any cases of infraction of safety rules.

The ultimate aim of any safety program is the safety and protection of persons or property. The value of life cannot be stated in terms of dollars or cents. The suffering and loss of time and money resulting from accidents cannot be tabulated. We, as industrial-arts teachers, should bend every effort toward a safer America—we should think safety, teach safety, and act safely at all times. Most students receive their introduction to the operation of hand and machine tools in the school shop—an introduction stressing safety is essential.

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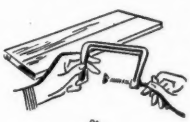

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Industrial Arts . . . *from page 7*

volved in those vocations. Study in social-studies classrooms of production of natural resources, which furnish materials used by industry, is advantageously supplemented in shop work by discussions relative to materials used and their origins. Similar supplemental information is given on manufactured products.

General, physical, and chemical sciences are all important tools of industry and, therefore, of industrial arts. In the use of every hand tool and machine, one or more principles of physical science is exemplified. Use of paints, stains, inks, etching acids, heat-treatment processes, and various other operations and processes are examples of chemical science. Good industrial-arts teachers effectively use every opportunity to correlate and fortify students' information in the field of science.

It has long been accepted that it is more desirable for students to develop individual ideas for projects completely from the start than for them to follow ready-made drawings or instructor's dictations. In this connection, many schools have developed correlation between art and industrial-arts departments which has been beneficial to both departments. Students profit immeasurably by being assisted in developing their own ideas and in cultivation of their individual creative abilities.

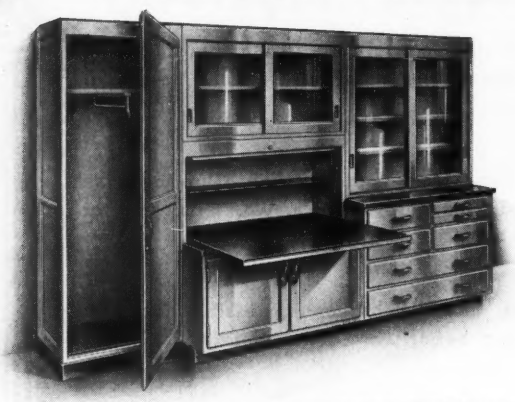
Development of interest in leisure-time activities has been very important and may become more so with the prospect of more leisure time being available in the future. It is often amazing to note the variety of hobby interests represented in a typical class of boys. Many hobbies are further enriched by acquisition of additional related information and of applicable skills. For example, an assembler of models with the acquisition of additional skills may become a builder of original models, a collector often builds display blocks and racks, or a boy scientist may build additional scientific equipment. Many boys who have had no leisure-time interests find an impetus to develop interests because they have access to equipment and guidance. Frequently shop activities develop into a life-long hobby.

Industrial arts is concerned with the development of skills in the fabrication of materials of industry and the teaching of the intelligent purchase, use, and maintenance of materials and finished products of industry. Quality of workmanship varies in accordance with pupils' individual differences and, to some degree, in accordance with differences in adequacy of equipment and teacher skills. Industrial-arts courses develop tool manipulation and fabrication of the greatest possible variety of available materials at least sufficiently well to enable students to maintain their home equipment. Related information includes instruction on purchase and proper maintenance of a broad variety of materials, tools, and equipment. Every opportunity is utilized to develop information concerning use and maintenance of home appliances. This element of industrial-arts education is as essential for girls as for boys as they use home appliances much more frequently.

Our nation is justly proud of the magnificent job which has been done by many high-school industrial-arts departments in helping to train men and women for war industry. It will be equally proud of the contributions which many of those same departments will make in retraining for peacetime industry and in retraining veterans. That was, and still is, a necessary job and the challenge has been wonderfully met. However, the main long-range function of industrial arts is one of general education for our American boys and girls while they are still in school. May we continue to develop industrial arts in its richest form—as general education.

Sheldon

VOCATIONAL EQUIPMENT



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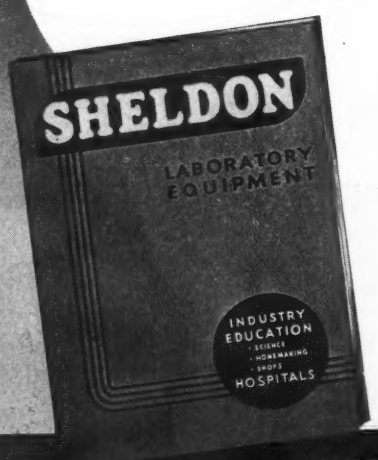

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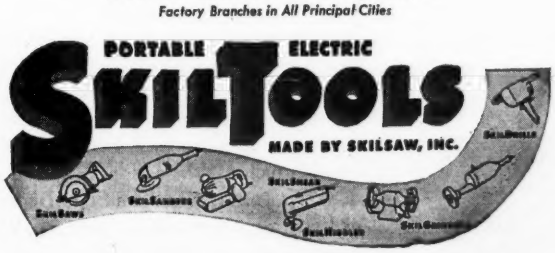

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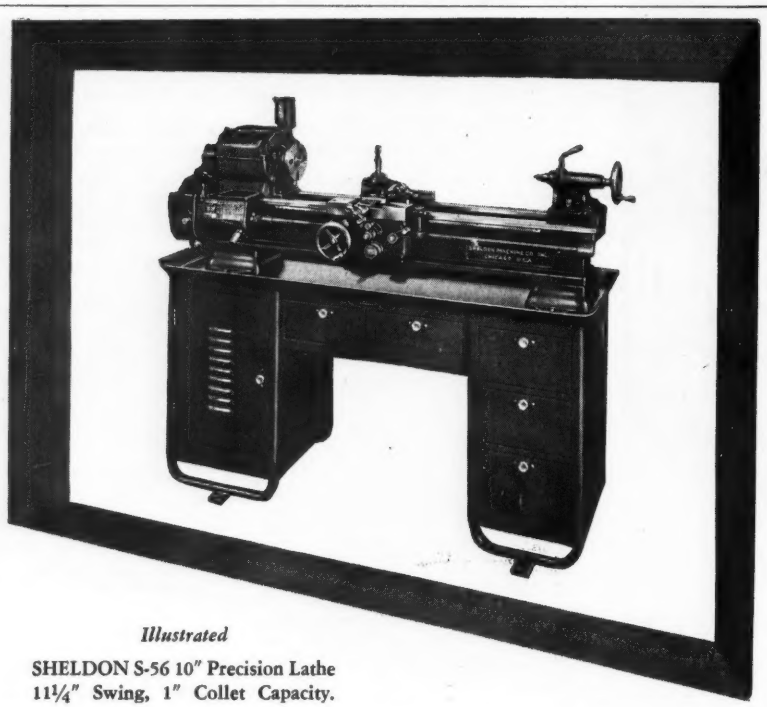
ABOUT YOUR FELLOW TEACHERS

PROFESSOR WILLIAM C. ASH, director of vocational teacher education in the school of education of the University of Pennsylvania, has retired. . . . WILLIAM E. WARNER, professor of industrial-arts education at the Ohio State University, has returned to his position after a tour of duty in the Army as an education officer in the European theater. . . . EMMETT O'BRIEN, director of the Boardman Trade School, New Haven, Conn., has been appointed director of vocational education for Connecticut, succeeding A. S. BOYNTON who retired. . . . FRANK DALTON, lecturer in vocational education, University of Michigan, has been elected president of the Michigan Industrial Education Society. CLAUDE BOSWORTH, director of vocational education, Muskegon, Mich., schools, was elected vice-president, and ARTHUR REAGH, Grand Rapids, Mich., schools, was re-elected secretary-treasurer. . . . O. C. ADERHOLD, professor of vocational education at the University of Georgia, has been named dean of the college of education at the university. . . . HARRY A. PEDERSON, formerly in the instructor training department, Armored School, Fort Knox, Ky., has been appointed a member of the faculty of the industrial-arts department, State Teachers College, Platteville, Wis. . . . HOMER T. RAGLE, assistant state supervisor of trade and industrial education for Missouri, has been named director of vocational education in the Springfield, Mo., schools. . . . EDWARD H. LANG of the New York State industrial education department has resigned to become principal of the new Technical and Industrial High School, Syracuse, N. Y. . . . R. RANDOLPH KARCH, formerly principal of the High School of Graphic Arts and Printing, Cincinnati, Ohio, and lieutenant commander in the Navy, has been appointed director of typography and advertising manager of the Intertype Corporation, Brooklyn, N. Y., where he will also manage the printing department. . . . NORMAN B. CARR, chairman of the industrial-arts department of the Bound Brook, N. J., schools, has been named instructor in industrial arts at the Trenton, N. J., State Teachers College. . . . E. C. ESTABROOKE, former lieutenant commander in the Navy and member of the industrial education staff of the Pennsylvania State Department of Public Instruction, has become educational director of the American School and the American Technical Society, Chicago, Ill. . . . HERBERT (NICK) CARTER, former coordinator in the Lapeer, Mich., schools, has been appointed coordinator at Pontiac, Mich. . . . DAVID J. GOODMAN has been named editor-in-chief of the new audio-visual department of Popular Science Publishing Co., New York. . . . WAYNE P. HUGHES, field representative, has been named to succeed KIMBALL WILES as head of the school and college division of the National Safety Council. . . . L. J. FOARD, former automotive instructor in the Army Wharton Technical School in England, has been appointed veterans vocational coordinator on the staff of the Michigan State Board of Control for Vocational Education. ARTHUR HANSEN has also joined the staff as a supervisor of on-the-job training. . . . New members of the Editorial Advisory Board of SCHOOL SHOP, replacing those whose terms expired, are: A. B. MAYS, University of Illinois; S. J. PAWELEK, Baltimore schools; E. J. SIMON, Illinois State Director of Vocational Education; R. C. WENRICH, Michigan State Director of Vocational Education; and E. L. WILLIAMS, Texas A. and M. College.



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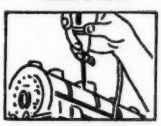

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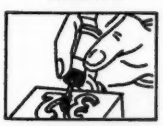

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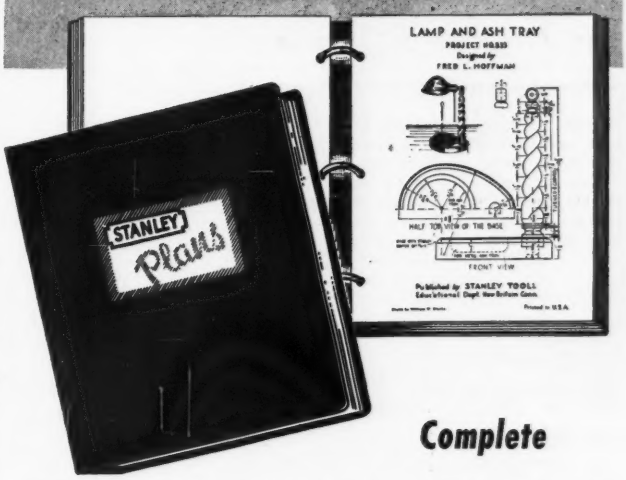

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Don't Throw Them Away!

Small Drills and Tools Can Be Salvaged

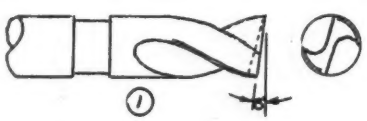
BY *George R. Miller*

Salvage operations on small high-speed tools offer real teaching opportunities in machining and in utilization of frequently wasted tools. Moreover, the machine-shop teacher can add to his tool supply without increasing his budget. George R. Miller teaches machine shop at Western Michigan College of Education, Kalamazoo.

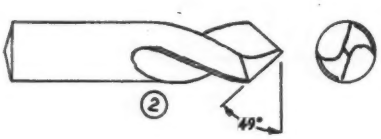
TESTED INSTRUCTIONAL PROJECT

THAT broken drill or other high-speed tool may have more life in it than you think! Don't throw it away because you can make another tool out of it with a little work and ingenuity and at the same time teach your students the value of salvage and how to machine high-speed steel.

Many of the following ideas have been in use in machine shops for years and the author makes no claim for originality. Yet too often broken drill shanks go into the scrap box when they could be utilized around the school machine shop. Few text or reference books give information on this type of activity. No shop contains all the small tools necessary to do the jobs that arise but a salvage operation may add enough tools to make many jobs easier. Incidentally, clearance allowance for these tools may be made by adjusting the tool holder.

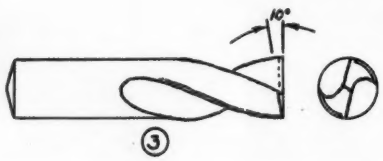


1. Where no reamers are available, small odd diameter holes may be bored with drills ground as shown above.

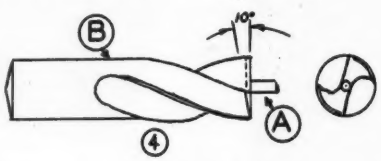


2. Short drills can be ground for counter sinks for wood and machine screws and also for starting accurate holes if the web is thinned. (See *Machinery's Handbook* and *Shop Theory* by Ford Trade School faculty members.)

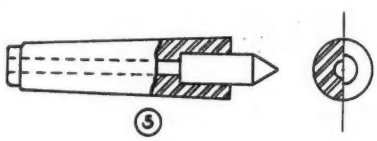
3. By grinding short drills flat on the end and then grinding clearance, they may be made into bottom drills. Why not make a set for fillister head cap



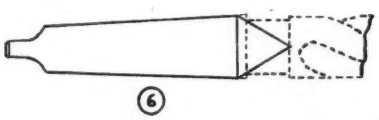
screws and place in your tool crib? They will save your regular drills.



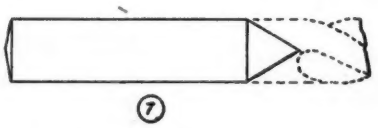
4. A very good counter bore or spot facer can be made by selecting a drill to meet size *B* and grinding *A* to pilot size. If you do not have a regular cutter grinder, you can rough out pilot on your bench grinder and finish with a tool-post grinder in the lathe. Cutting clearance may be ground by hand with small hand grinder.



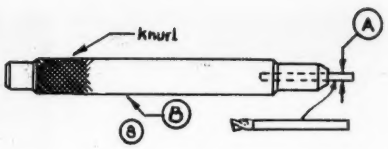
5. Shanks of drills over 3/8" in diameter can be fitted into taper shanks and used as hard lathe centers.



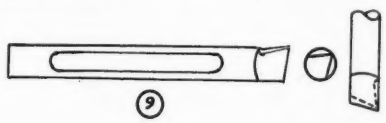
6. Taper shank drills can be ground and used for lathe centers and for tailstock centers. It is best to pick a drill with a taper that fits your lathe tail stock so as to eliminate the use of drill sleeves.



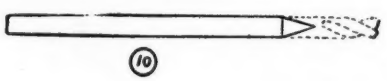
7. Transfer punches may be made from drill shanks. A transfer punch is used to transfer the location of a drilled hole onto another piece so that the second hole will be in the proper location in relation to the first.



8. Accurate pin punches can be made by fabricating a conventional pin-punch handle (*B*) and inserting a drill shank (*A*) with a press fit.



9. Industry today is using many round boring tools which are held in special and regular boring tools. You can make your own from drill shanks or center drills. The latter have been found to be more practical because of their uniform size and the large number of broken center drills found in the average shop. Note: The shop term, center drill, is listed in all tool catalogs as combination drill and counter sink.



10. Scribers, divider points, and beam trammel points may be made from small drill shanks by grinding a point on them.

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TO THE PATRONS, STUDENTS AND TEACHERS OF AMERICAN SCHOOLS:

The week beginning November 10 has been designated for the twenty-sixth observance of American Education Week. It should be the occasion for all citizens to visit their schools and to give serious thought to the theme selected for this year's observance, "Education for the Atomic Age."

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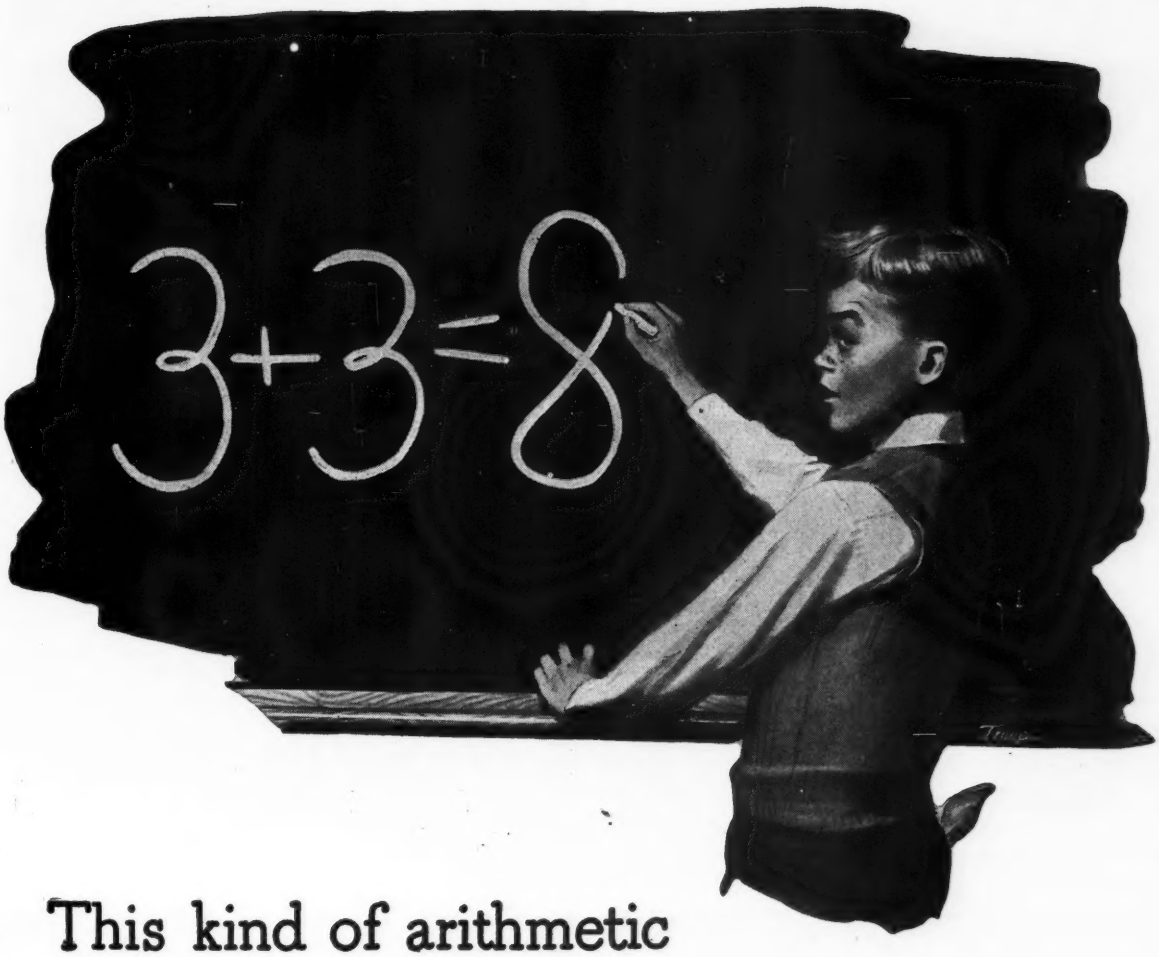
HARRY S. TRUMAN



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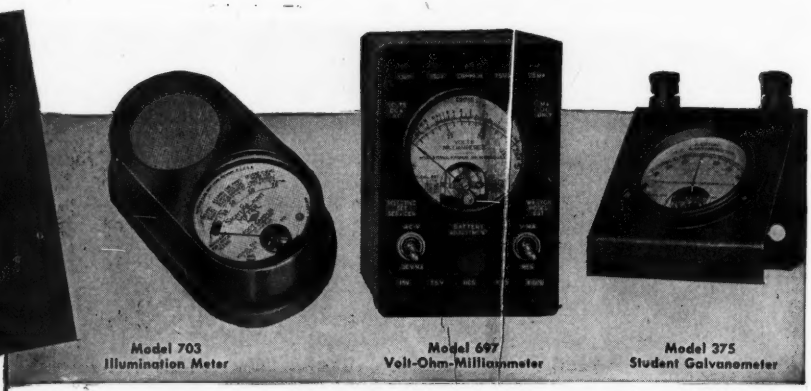

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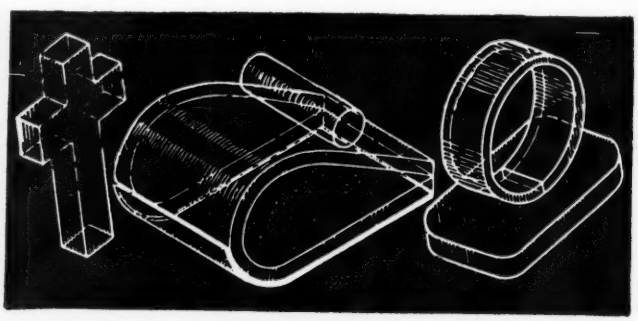

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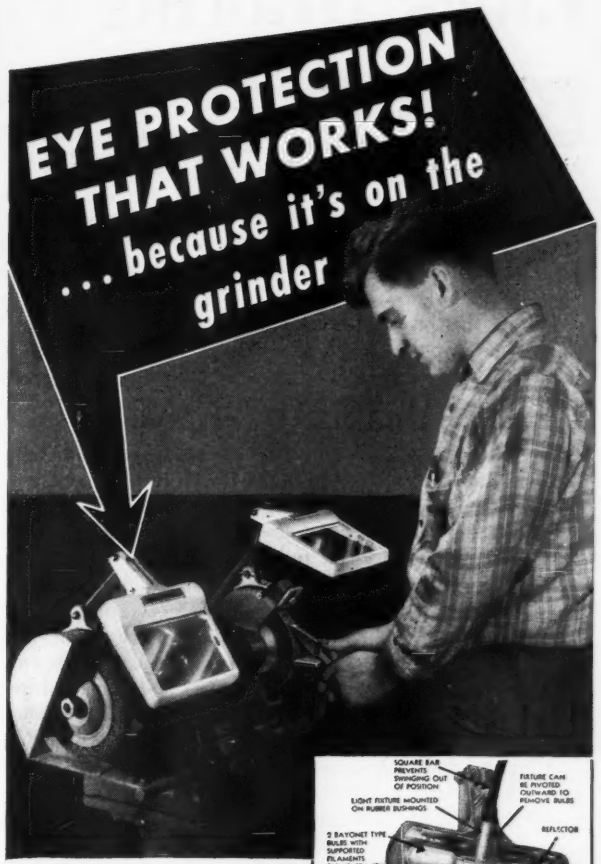

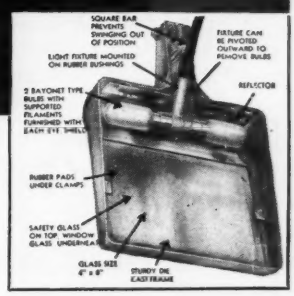
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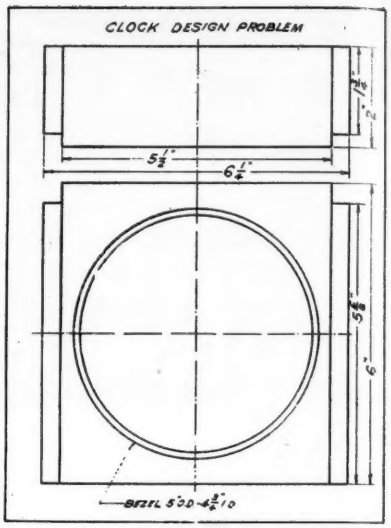
Clock Drawing Problem



BY *E. Carl Stock*

Fitzsimons Junior High School, Philadelphia, Pa.

A MECHANICAL drawing problem that has demonstrated its appeal to boys of junior-high-school age is shown in the accompanying drawing. This illustration shows a clock case which was developed to encourage the boys in my mechanical drawing classes to attempt the solution of a simple design problem.

I begin this problem by teaching the pupils to draw the case. The sizes of the two circles representing the bezel ring are given and, from this point on, the problem rests in the pupil's hands. In my attempt to describe the use of a clock, I have an opportunity to present the functional aspect of design. In somewhat the same manner, the introduction of Arabic, Roman, and modern numerals serves to lead the pupils on to the desirability of designing an original set of numerals. The division of the dial into the 12 hour spaces affords an opportunity to correlate with the mathematics class and to use the 30-60-90° triangle and T-square.

After the dial is designed, the design of the hands is introduced. Here again an attempt is made to inspire the pupils to create a new design, keeping in mind that most hands are stamped from thin sheet metal and that the design should show this characteristic. The last point in the lesson is to make the pupils realize the necessity of designing the case, dial, and hands so that they contain the same general characteristics and are in harmonious accord. This last point presents an opportunity to stress sales appeal and to explain that the designer must keep the retail merchant and the customer in mind or the design fails.

Summarizing, this problem affords correlation with the mathematics class, knowledge of the function of the object, necessity of creating an harmonious whole out of case, dial and hands, awareness of sales appeal and merchandising, and finally, drawing technic.

As examples of the ability of boys to produce individualistic designs, I have obtained, in addition to the usual types of clocks with commonplace numerals, a clock with the hands drawn in the forms of a short, fat boy and a tall, thin boy. Another design had the Spanish words for one to twelve substituted for the numerals. The draftsman, in this case, was studying Spanish and had the exportation of merchandise to South America in mind. Other designs had a sweep hand added and one had a dial with small openings exposing the month and day, while still another had the numerals replaced by 12 letters forming a word. This last clock was an advertising model.

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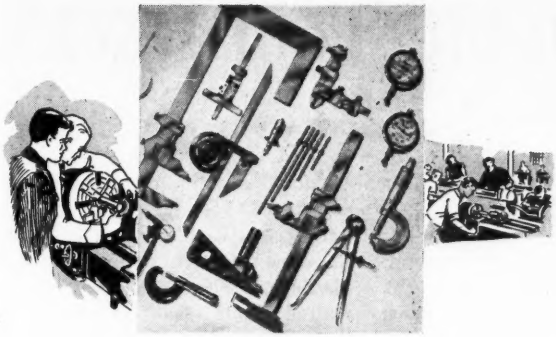

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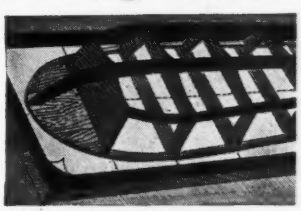

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A Portable Tool Rack

BY *Charles Jones*

Samuel Gompers Vocational High School,
Bronx, New York

TESTED INSTRUCTIONAL PROJECT

HAMMERS, pliers, and screw drivers are used more frequently in electrical shops than any other tools. This is especially true at the lower grade levels.

The rack in the accompanying photographs was constructed to make these tools handy for students and thus save time in the distribution and checking of the tools.

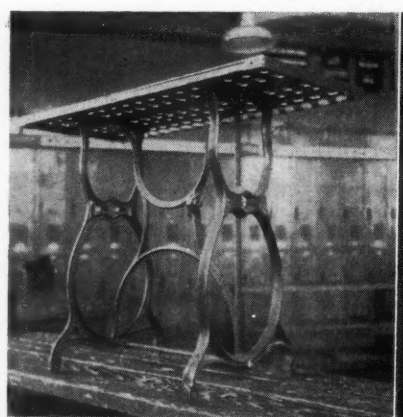
Two methods of construction are illustrated. In the first case an old sewing-machine base was used. In the second model the under part of the rack was made of ½" conduit. The first is the simplest to construct, of course, as the only labor involved is in the making of the top or tool-holding section. In both designs, a sheet steel shelf from a metal cabinet was utilized for the top.

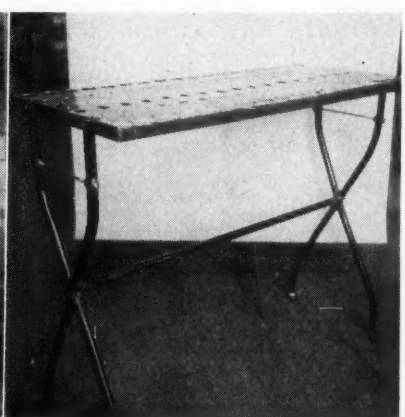
Should it be difficult to procure an old sewing-machine base, the conduit base construction is still easy although slightly more involved. The pictures are self explanatory but it might be added that in the conduit construction all points of contact were spot welded. Close examination of the pictures will reveal that the vertical edges of the top section were set in the ends of the conduit. This was done by merely setting two hacksaw blades in the frame and cutting to the desired depth. The conduit was also flattened where the legs cross. Pieces of doweling were driven into the legs and drilled to accommodate ordinary casters.

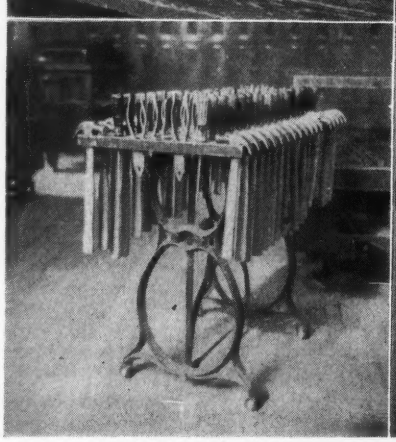
The round holes in the top section were made with the aid of a knockout punch of the proper diameter, though considerable filing was necessary to make the oblong openings for the pliers. The tools were placed on 2" centers which was found to be a convenient size. However, this is a matter of individual requirement.

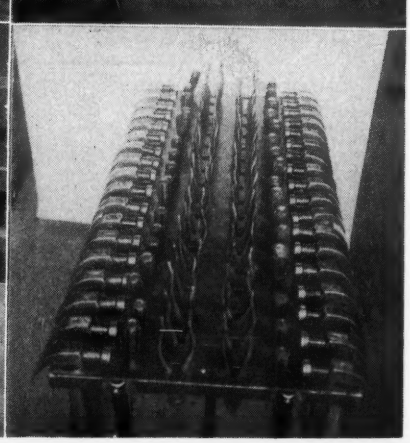
The only materials that were not available in the shop were the old sewing-machine base which was purchased at the local junk yard and the casters which came from the five-and-ten.

The project works very smoothly. The rack is moved out of the toolroom at the beginning of the period and at the close it is moved back after a quick glance to see that all tools have been returned.









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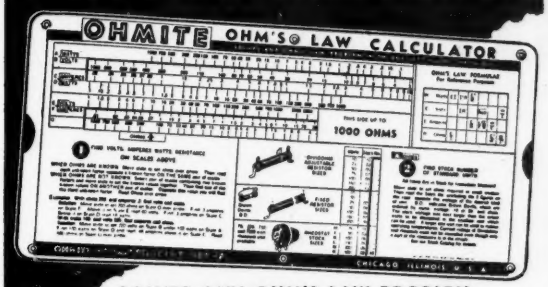

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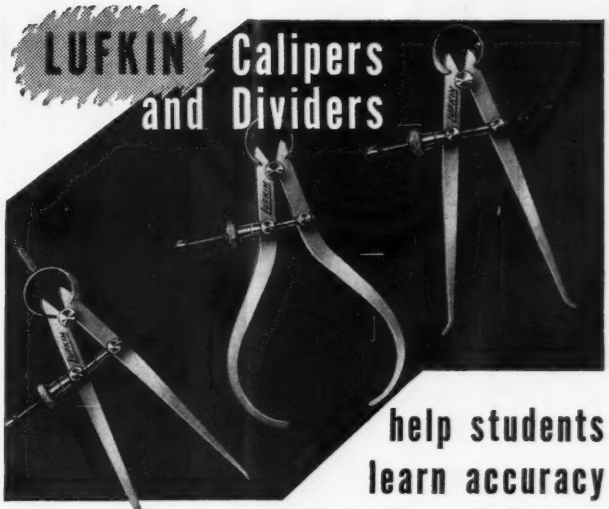

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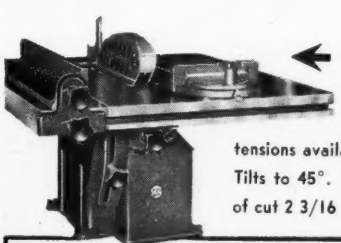

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Board Foot Display

The photograph shows an easily built aid for teaching board measure. A "board foot" is shown in five different shapes. "1 Bd. Ft." is stenciled on each piece and following is stenciled the dimensions of the piece. The boards are finished in natural shellac with the stenciled figures in color. The display is hung on the wall above the blackboard where it is in full view of the class.—*W. P. Watts, Oroville, California, High School.*

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The use of a check list by beginning students in drawing trains them in the habit of checking and saves the instructor's time, much of which is wasted checking and correcting conditions that could have been taken care of by the student before submitting the plate for approval.

The following check list has been used successfully for several semesters. It is intended for use by the student after he thinks he has completed the plate.

1. Make sure that *all* instructions that are given in your book or by your instructor have been followed exactly.
2. Make sure that all necessary views have been made and completed and that they are correct.
3. Make sure that all object lines, invisible edge lines, center lines, etc., are in all views.
4. Make sure that all object lines are dark and sharply defined (no partially erased lines).
5. Make sure that all necessary dimensions are shown (no repeats) and are in their proper place. Check for correctness by scaling and by referring to problem assigned.
6. Make sure that all dimension and extension lines are sharp, clear, and dark enough to be easily visible (but not as wide as object lines).
7. Make sure that all arrowheads have been made and that they go to the proper lines.
8. Make sure that all lettering (notes, title, name, etc.) has been completed.
9. Make sure that all dirt spots have been removed and that the drawing is as clean as possible.

This list is usually given to students after the third or fourth week and they keep it for reference use after each plate is completed.—*W. Stuart Grau, Lake View Evening School, Chicago, Illinois.*

Boring Small Holes

If when boring with a hand drill one of the small size bits is missing, a brad may be substituted. Simply cut off the head, insert it in the hand drill with the point out, and drill. This procedure is specially useful when a hole must be made for a particular size of brad or when a hole needs to be drilled to prevent splitting before driving a brad.—*S. S. Palestrant and E. I. Russ, W. H. Taft High School, New York City.*

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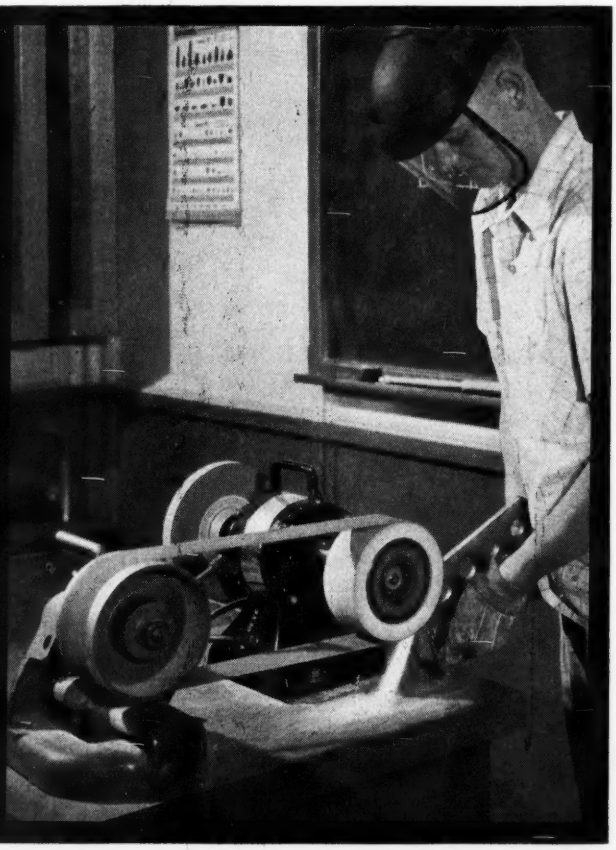

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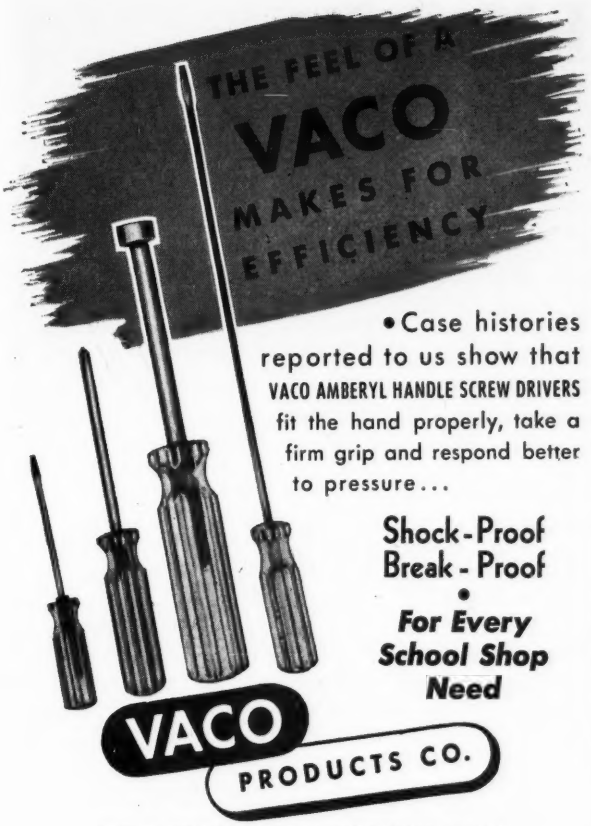

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6. Built-In Shock Absorbers (Pat. Pending)
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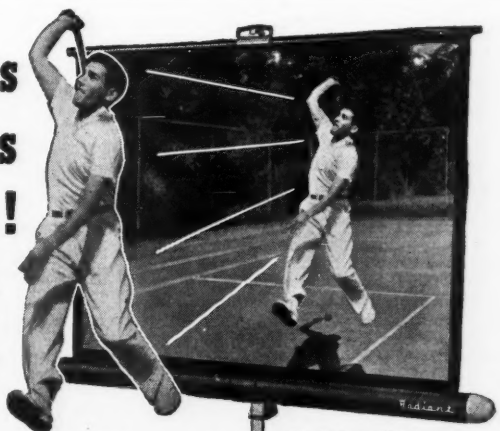

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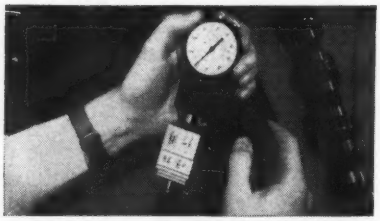
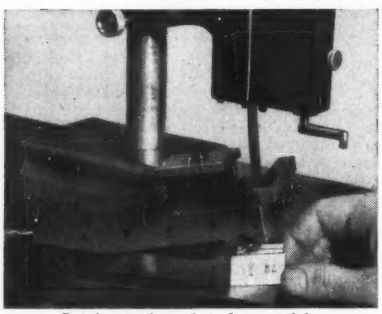


Setting a snap-gage to millionth-inch accuracy for a camshaft inspection.



Setting a sine-plate for precision inspection of an angle or taper.

PRECISION shop measurement can be learned only by making precision measurements. The day when the micrometer caliper set the metes and bounds of attainable accuracy is past. Its passing was foreshadowed when Ford Motor Company made Johansson Gage Blocks available to all industry in America at moderate cost.

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NEWS

What's Doing in the Field of INDUSTRIAL EDUCATION

AVA to St. Louis

PLANS are being made for the annual convention of the American Vocational Association which is scheduled for December 4-7 at St. Louis, Mo. Headquarters will be at the Jefferson Hotel. The convention is being held this year during December as was customary before crowded hotel conditions forced it into February. Extensive exhibits are planned.

Model Research

A COOPERATIVE research project between the Model Industry Association, Inc., and the industrial education department of Texas A. & M. College has been announced by Dean Howard W. Barlow of the school of engineering. Glenn M. Tindall, executive director of the Model Industry Association, has just completed arrangements for the project with Chris J. Groneman, acting head of the industrial education department. Rogers Barton, model airplane designer and builder and winner of many model airplane contests, is the member of the teaching staff assigned to the project. He has been a member of the engineering drawing faculty. The research work will involve grading and evaluation of model airplane kits now on the market. An effort will be made to standardize the kits so they will be more acceptable to schools and recreational groups, according to Mr. Groneman who will supervise the project. It is hoped to devise courses of study for public schools in model aircraft design, construction, and flight.

Austin Builds

VOTERS of Austin, Minn., have approved a bond issue for the construction of a new vocational building by the overwhelming majority of almost 18 to 1. The growth of the system has made imperative the new construction which follows on the heels of a building program completed in 1940. Construction will begin as soon as materials are available.

The Navy Releases

MORE than 500 training films and filmstrips are being released by the Navy for educational use. Produced during the war, the films contain many subjects of interest to shop teachers. Prints will not be available until early fall and inquiries should be addressed to the U. S. Office of Education, Washington 25, D. C.

Timer . . . *from page 10*

bakelite panel with rubber cement.

The bakelite panel should be 4" to 6" square by ¼" thick while the depth of the timer should be from 5" to 6". The base can be of wood and a case made out of sheet aluminum or wood.

The wiring diagram is shown in Figure 1. The indicator bulb, which serves to show when the switch is on, should be mounted on the top of the case. The socket for this bulb is of the candelabra type and the bulb should be a ruby one.

The mechanism should be adjusted for operation by setting the indicator knob at the zero position on the dial. The arm, part 4, which carries the mercury switch is then fastened in a true vertical position. The mercury switch should then be set 1° or 2° off the horizontal so that the contacts are open.

Operation procedures are as follows: Set the toggle switch in the "off" position. *This is important.* Pull out the indicator knob and turn counter-clockwise to the desired number of seconds and then release the knob. Turn on the toggle switch which starts the motor, turns on the printer or enlarger lamp, and also turns on the indicator bulb on top of the case. When the arm which carries the mercury switch reaches the bottom or zero position, the motor will stop and the printer or enlarger lamp will shut off, but the indicator bulb will stay lit, indicating that the toggle switch should be thrown to the "off" position before resetting the indicator knob.

The accuracy of the timer can be checked by using a selfstarting electrical clock in place of the contact printer. One or two minor adjustments may be needed on the arm which carries the mercury switch.

Shop Teachers Service Moves to October Issue

An announcement of great importance to our readers is that SCHOOL SHOP's annual Shop Teachers Service has been moved from the February issue to the October issue. *This change will be permanent.*

Many excellent free or low-cost teaching aids will be offered shop instructors by business firms so, please watch for the October issue, check the numbers on the coupon corresponding with the items you desire, and return the coupon to us as quickly as possible.

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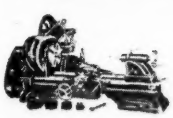

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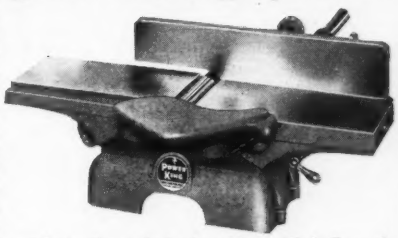

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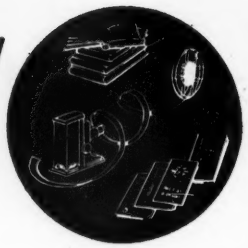

Modern Metalcraft. Feirer. Peoria, Illinois: The Manual Arts Press, 1946. Pp. 288. $3.50.

An unusual method of presentation is used in this book. A total of 33 operations from measuring stock to coloring metal are described in detail. Accompanying each description is a project incorporating the operation described. The project idea includes a picture of the finished project, a working drawing, a procedure sheet, and, occasionally, step-by-step pictures. An extensive index makes it easy to find other operations which might be needed in making the project. Instructors of bench metalwork will find the book valuable both for direction sheets and project material.

John L. Feirer is a member of the faculty of Western Michigan College of Education, Kalamazoo.

Soaring Flight. Horsley. New York: Current Books, Inc. 1946. Pp. x + 326. $4.00.

A beautifully written and competent discussion of the art of gliding. The book is a *rara avis* in modern publishing—a technical treatise written in a pleasant literary style. While the author is British and thus refers only to British soaring activities, the subject matter is universal and the reader who is interested in soaring will find the volume a complete treatise on the subject. A 50-page appendix deals with gliding in the United States and includes factual information on gliding clubs, soaring sites, and U.S. rules and standards. Teachers of aviation subjects will find the book of real and lasting worth.

Terence Horsley is the editor of the *Manchester Chronicle.*

General Woodworking. Johnson and Newkirk. New York: The Macmillan Company, 1946. Pp. vii + 283. $2.00.

Designed as a pupil textbook in general woodworking, this volume may be used for a one-year introductory course of an intensive nature or expanded into a two-year program. The introductory chapter deals with the common woods while the remaining chapters cover hand and machine woodworking, wood finishing, cabinetmaking, carpentry, wood turning, elementary patternmaking, and wood carving. A chapter is also included on the home workshop. A number of projects accompany each chapter. Excellent photographs illustrate various operations. Most tools are illustrated in use rather than relying on catalog illustrations supplied by manufacturers as is done so frequently in books of this type. The book should be very teachable with questions, topics for discussion, and a bibliography at the end of each chapter.

William H. Johnson was formerly superintendent of the Chicago, Illinois, schools and Louis V. Newkirk is director of the Bureau of Industrial Arts Education, Chicago Public Schools.

Sawing Machines—Precision Sawing and Filing Methods. Vol. I. DoALL Instruction Programs. Minneapolis, Minn.: The DoALL Co., 1945. Pp. 263. Free if requested on school letterheads.

Covers contour sawing and filing in all its aspects, applications, and operational technics. One section of the book covers conventional sawing procedures and the other section deals with high-speed sawing. Work projects, tests, and grading guides are included.

General Bookbinding. Groneman. Bloomington, Ill.; McKnight & McKnight, 1946. Revised Edition. $1.00.

An excellent introduction to the craft of bookbinding and well illustrated with photographs of various operations. The volume is designed to be a unit in a graphic arts course or as an instruction book for bookbinding as a craft activity. The revised edition includes a chapter on the treatment of books by H. H. Kirk. A number of projects are shown in detail to illustrate each type of bookbinding operation and methods are outlined for making binding equipment at low cost.

Chris H. Groneman is professor of industrial education, A. and M. College of Texas, College Station.

Automobile Fundamentals—Chassis and Power Transmission. Kuns, Plumridge, et al. Chicago: American Technical Society, 1946. Pp. 754. $4.75.

An exhaustive treatment of the construction, care, and repair of automobile bodies, frames, chassis, clutches, transmissions, front end suspension, springs, steering gears, wheels, tires, and brakes. Extensively illustrated with photographs and drawings, the book also contains a glossary of automotive terms. Instructors in automotive mechanics will find the volume excellent for reference purposes and related information.

Ray F. Kuns is principal of the Automotive Vocational High School, Cincinnati, Ohio, and Tom C. Plumridge is head of the Automobile Engineering Department, American School, Chicago.

Handbook of Knots. Graumont. New York: Cornell Maritime Press, 1945. Pp. 224. $1.00.

As the name indicates, this new book is a handy, pocket-size edition which illustrates and explains 428 knots and ties in detail. Includes hitches, ties, bends, sheepshanks, bowlines, simple knots, ornamental and trick knots, mat weaves, sennit braiding, splices, braids, slings, etc.

For extra handiness the different knots are indexed by occupations and avocations as well as by their names. Knots used in 48 different occupations and avocations are covered.

Code of Minimum Requirements for Instruction of Welding Operators: Part A—Arc Welding of Steel 3/16 to 3/4 Inch Thick. Prepared by the Committee on Minimum Requirements of Instructions for Welding Operators in Trade Schools of the American Welding Society, this publication is an authoritative standard. Contains course of study, lists of equipment and facilities, instructor qualifications, tests and testing apparatus, and bibliography and lists of visual aids. Copies may be obtained from the society, 33 West 39th St., New York City, for 50 cents.

A Business of My Own by Arthur E. Morgan, former president of Antioch College and former chairman of the Tennessee Valley Authority, is the result of five years of travel visiting small businesses. Extremely useful for counselors and teachers whose aid is requested by students or graduates expecting to enter business for themselves. Published by Community Service, Inc., Yellow Springs, Ohio. $1.00. Paper bound.

Forty Years in Vocational Education by Dr. J. C. Wright, recently retired Assistant Commissioner for Vocational Education, U.S. Office of Education, is a reprint of Dr. Wright's speech given on February 7 at the annual banquet of the American Vocational Association. The talk outlined the development of vocational education through the four decades Dr. Wright has been actively working in the field. The pamphlet is printed by the Burgard Vocational High School Press, Buffalo, N.Y., and distributed by the U.S. Office of Education, Washington 25, D.C.

A Catalog of U. S. Government Films and Filmstrips has just been published by Castle Films, Inc. It contains a complete listing of 16mm sound films and 35mm filmstrips from the U. S. Office of Education, the Navy, War Department, Department of Agriculture, and U. S. Public Health Service. A total of 1158 items are listed. The catalog is available without charge from Castle Films, Inc., 30 Rockefeller Plaza, New York City. Please mention SCHOOL SHOP.

Our Industrial Air Power is the name of a new educational film on the many industrial uses of compressed air which is available without charge on a loan basis for showing to students. Among the sequences contained in this 25-minute, 16mm sound-color film are: Fundamentals of Air Compression, Properties of Compressed Air, How Different Types of Compressors Work, and How Compressed Air Is Used. Write Quincy Compressor Co., Quincy, Ill., for information and dates. Please mention SCHOOL SHOP.

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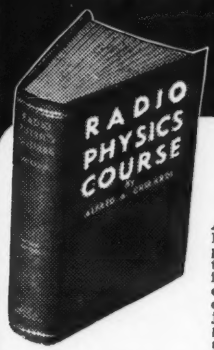

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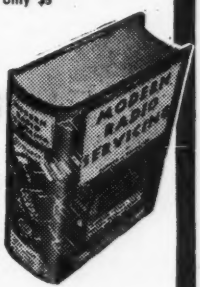

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5. How to teach, including planning of teaching material, presentation of content, use of teaching aids, grading students' work, etc.

6. How to develop written instructional material such as instruction sheets, assignment sheets, information sheets, blueprints, and shop drawings.

7. How to manage a school shop, organize shop personnel, keep shop and class records, procure jobs, and handle routine duties.

8. How to plan and lay out a trade shop, select, purchase, and install machinery and equipment including the purchase of small tools.

9. How to counsel students, understand the meaning of guidance, and the responsibility of the vocational teacher in a guidance program.

10. How labor laws and labor regulations affect the youthful worker as set forth in state and federal legislation.

11. How to speak correctly.

12. How to write correctly, including proper spelling and the use of punctuation according to accepted rules of grammar.

13. How to use the blackboard effectively by acquiring ability to make sketches in accordance with the principles of orthographic and perspective drawing.

14. How to apply the knowledge of psychology, methods of teaching, and shop organization and management under practical teaching conditions.

15. How to develop instructional aids such as slides, blow-ups, mock-ups, models, as well as operate audio-visual equipment.—*From a report by the National Association of Industrial Teacher Trainers.*

Washington . . . *from page 40*

must be considered—and aided—together.

»Here is a check-list of other Washington educational events which occurred during the summer:

The Federal Board for Vocational Education went out of existence July 16. It was ended by the President under a Reorganization Act, "because it had outlived its usefulness."

President Truman signed the permanent school lunch act on June 4.

The United States decided to join officially the United Nations Educational, Scientific, and Cultural Organization on July 30.

And sometime during July the millionth veteran was enrolled in a training or educational course. Of the million, one-third are in colleges, one-third are on-the-job training, and one-third are in courses of less than college grade, with vocational training as the favorite activity.

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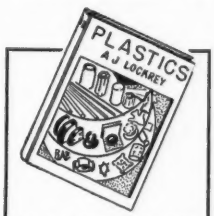

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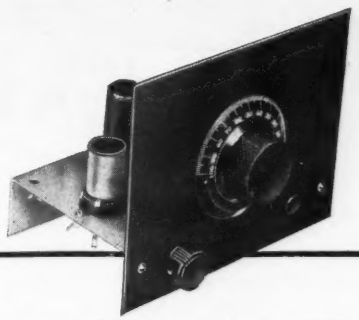

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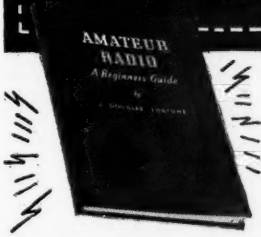

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FROM WASHINGTON

BY MICHAEL PACA

ON August 1, President Truman signed a bill which adds some $15,000,000 to the appropriations now being spent under the George-Deen Act. The bill went smoothly through Congress. In the Senate, few lawmakers questioned Senator George's statement that additional money is needed because "the end of the war and primary training of many of the veterans has put an unusual load on the vocational educational system. . . ." When, in the House, Rep. Jensen (Iowa) asked "why is it necessary to have more money appropriated," Rep. Barden (N. C.) replied:

"Because the program has been such a tremendous success throughout the nation over many, many years. The number of those enrolling in the (vocational) schools has been on an upward trend. . . . At the present time, 165,982 veterans are taking the training and there is a long waiting list. . . ."

There was little debate after that.

»The legislation that was approved is known technically as S. 619. But it is a very weak and hardly recognizable facsimile of the original version of that bill. Before S. 619 went into the Senate committee, it called for more than $97,000,000 to advance every phase of vocational education, industrial arts, and guidance. When it came out of the Senate committee, the $97,000,000 had been sliced to around $16,500,000. In the operation that the Senators had performed on it, they cut out provisions for area vocational schools and eliminated entirely funds for industrial arts and office occupations. Later, the House Education Committee took out references to vocational guidance. Shorn of what some Congressmen called "trimmings," the bill authorizes additional funds only for agricultural, home economics, trade and industrial, and distributive occupations training.

»In accepting half-a-loaf, supporters of the original S. 619 were comforted by the promise, made in the Senate, that at the next session new measures for vocational training would be considered which would "carry the work forward in a proper way." Such a promise was in effect made by Senator Johnston (S. C.), a staunch friend of vocational education.

But there is developing some doubt that bills dealing with aid to vocational education *alone* will be considered seriously by Congress next year. The stewards of educational legislation on Capitol Hill have reached a momentous decision this summer. It is: to promote and develop all phases of education at one and the same time, to do so on a broad basis and over a long period of time. Their decision is embodied in the Education Development Act of 1947—a ten-year plan for education which will probably be hotly debated for many months to come. It is said to have been drafted by Bureau of the Budget officials interested in consolidating federal-aid legislation.

In introducing the bill, Senator Murray said: "In the past we have studied on a piece-meal basis the problem of federal aid to education. . . . A new and bolder approach with respect to federal aid to education seems to be in order. . . . We need a program so broad and so challenging that it will inspire the united support of all groups who are truly interested in raising American educational standards for all our citizens and improving the general social and economic life in our country."

The Education Development Act of 1947 seeks a total of $805,000,000, which by 1957 would rise to nearly two billion. Aided would be every phase of education, including libraries, school buildings, camping, scholarships and fellowships, and research.

Vocational education is covered in Title I, which calls for a half billion in 1947 and rising to one billion in 1957 (and every year thereafter) for "basic programs and services." One-third of this sum is to be spent for secondary education, including "vocational education of non-collegiate grade."

Whether these funds are to be in addition to Smith-Hughes and George-Deen appropriations is only one of the unanswered questions. Sen. Murray himself says that the language of the bill is already under revision. A re-drafted bill will be introduced in January 1947, when the Eightieth Congress comes to Washington. This present bill has been introduced in the dying days of Congress so as to get the country talking and thinking about it.

While many controversial details are to be ironed out, the really-powerful leaders on the Hill will probably stick to their notion that all phases of education

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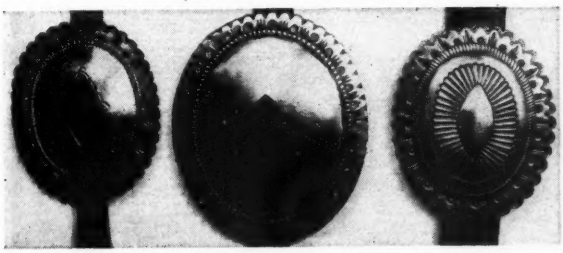

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